Space Weather Forecast

Issued on Sunday, 15 September 2024 at 01:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate class flares likely with a slight chance of further Strong class flares. Chance of G1-G2/Minor-Moderate storms on days 1 and 3 (15 and 17 Sep), these expected day 2 (16 Sep) with a chance of G3/Strong storms and a slight chance of G4/Severe storms due to a fast coronal mass ejection arrival.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with peak flare observed at 14/1528 UTC originating from AR2825 in the southeast.

There are seven sunspot regions on the disc with the most active being AR3825. It is a compact and magnetically complex region, with an inherently unstable north-south magnetic alignment. The remaining regions are generally small, with limited magnetic complexity and activity at this time.

A CME that was observed at, or close to the southwest limb, emerging around 14/0300 UTC is awaiting modelling to determine if there is any Earth-directed component. Numerous other CMEs were observed but these are not deemed to be Earth-directed.

Solar Wind / Geomagnetic Activity: Solar wind parameters were indicative of continued residual coronal mass ejection magnetic cloud effects. Solar wind speeds were slightly elevated. The Interplanetary Magnetic Field (IMF) Bt, was Weak to Moderate, while the north-south component, Bz, remained largely negative, peaking moderately negative. The net result of these parameters was for mostly Unsettled to Active geomagnetic activity (Kp 3-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has steadily risen since the strong flare on 14 Sep but has levelled off at moderate levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to High activity is expected, with M-flares likely and a slight chance of further X-class flares. These most likely from the large sunspot group in the southeast.

Solar Wind / Geomagnetic Activity: There are up to 3 coronal mass ejection arrivals and the potential for up to 3 coronal hole fast winds which feature in the forecast. The most significant feature is the 14 Sep coronal mass ejection which may bring Strong or Very Strong solar winds at Earth on day 2 (16 Sep), with a small chance this may arrive early, by late day 1 (15 Sep). This feature may have lingering effects into day 3 (17 Sep) combined with the second coronal hole fast wind. The final coronal hole fast wind may arrive day 4, with slightly elevated to elevated speeds expected.

Generally Quiet to Active geomagnetic activity is expected day 1 (15 Sep) with a chance of G1-2/Minor-Moderate and an outside chance of G3-5/Strong-Extreme storms should the 14 Sep CME arrive early with more potency than currently expected. The 14 Sep CME should then arrive with glancing impacts some time on day 2 (16 Sep) with G1-2/Minor-Moderate expected and a chance of G3/Strong and a slight chance of G4-5/Severe-Extreme storms. These risks gradually step-down into days 3 and 4 (17 and 18 Sep) due to waning CME and coronal hole

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fast wind effects.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) may continue to rise in response to the X4.5 flare, with a chance of exceeding the S1 Minor Radiation Storm level on day 1 (14 Sep), although this risk recedes later in the period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	40	80	50	20
Strong	G3	No	20	40	20	5
Severe	G4	No	5	10	2	1
Extreme	G5	No	2	2	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	30	20	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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